

Please replace the paragraph beginning on page 4, line 16 with the following amended paragraph.

For efficient ultrafiltration of macromolecular species, it is necessary to control the mode of the pore size distribution of the carbon membrane to the mesoporous range ~~between 1 to 10 nm of 2 nm to 50 nm~~. All nanoporous adsorbents – especially those based on carbon – have pores sizes in the range of 0.3 to 1.0 nm and cannot be used for this purpose. It has also never been experimentally verified that carbonizing a polymer-based ultrafiltration membrane can produce a carbon membrane having a pore structure in the ultrafiltration range. In fact, this synthesis route is highly unlikely to be successful because polymeric ultrafiltration membranes typically cannot exist without a plasticizer or humectant, both of which are intrinsically unstable at carbonization temperatures. Additionally, polymeric ultrafiltration membranes require external protection against drying of any kind which cannot be maintained during carbonization.

Please replace the paragraph beginning on page 5, line 3 with the following amended paragraph.

The process of preparing the novel membranes involves coating a porous metal membrane support with a polymeric precursor composition comprising both a carbonizing polymer and a noncarbonizing templating polymer. The noncarbonizing templating polymer directs the formation of pores in the ultrafiltration range. The coated support is then pyrolyzed in an inert-gas atmosphere. Lafyatis and coworkers found that the addition of certain noncarbonizing polymers such as poly(ethylene glycol) to carbonizing nanoporous-carbon precursors has a pronounced effect on the meso- and macropore structure of carbonaceous adsorbents synthesized through polymer pyrolysis. See Lafyatis and Tung (1991),

Poly(Furfuryl Alcohol)-Derived Carbon Molecular-Sieves -- Dependence of Adsorptive Properties On Carbonization Temperature, Time, and Poly(Ethylene Glycol) Additives,

Industrial & Engineering Chemistry Research, 30, 5, pp. 865-873. In addition to having a pore size distribution mode in the nanopore region (below ± 2 nm), these materials have a second mode centered in the meso- (~~1 to 100~~ 2 to 50 nm) to macropore (~~100 to 1000~~ greater than 50 nm) regions. Experimentation suggests that the location of this second mode depends directly upon the average molecular weight of the noncarbonizing templating polymer used, for example poly(ethylene glycol), as well as the synthesis conditions. Therefore, the inventors have unexpectedly found that by manipulating the characteristics of these additives, one can synthesize a porous carbon membrane with carefully controlled pore sizes in the ultrafiltration range.

Please replace the paragraph beginning on page 6, line 24 with the following amended paragraph.

The supported mesoporous carbon membranes of the instant invention have the capacity to permeate liquid solvents under pressure and to sieve, i.e., to retain, particles in the range from ± 2 to 100 nm. Thus, it is an object of the present invention that the supported mesoporous carbon membranes have an effective or operating pore size of from about ± 2 to 100nm. The effective pore size of the mesoporous carbon material is preferably from ± 2 to 50nm. The effective pore size of the mesoporous carbon material is most ~~preferable~~ preferably from ± 2 to 10nm.

Please replace the paragraph beginning on page 17, line 3 with the following amended paragraph.

For the supported mesoporous carbon membranes of the present invention, the larger pores (greater than ± 2 nm) are responsible for the ultrafiltration properties of the membrane and the ability of the membrane to efficiently permeate liquid water. During formation of the membranes according to the present invention, the application of successive coats of the liquid polymeric precursor composition blocks or closes the pores of the support and replaces these pores with those of the templated carbon.

Please replace the paragraph beginning on page 30, line 9 with the following amended paragraph.

The effective pore size of the membrane makes it ideal to retain many types of proteins and other macromolecular species having a kinetic diameter greater than about ± 2 nm. Generally, the retention mechanisms vary considerably from adsorption of solutes on the membrane surface, pore blocking or plugging, concentration polarization, and gel layer formation. The relationship between the dominance of these mechanisms and the morphology and characteristics of the membrane is poorly understood. See van den Berg and Smolders (1989), *The Boundary-Layer Resistance Model for Unstirred Ultrafiltration. A New Approach*, Journal of Membrane Science, 40, pp. 149-172. Porous carbons are known to possess very high internal surface areas – from adsorbate monolayer adsorption, typically about $1000 \text{ m}^2/\text{g}$ – and thus can block macromolecular components through the high adsorption affinity of the carbon. See Foley (1995) at 407-433. For example, due to the high protein adsorption of the carbon layer, BSA readily surface adsorbs onto the porous carbon layer of the ultrafiltration membranes prepared according to this invention. Consequently, the preferential adsorption can be used to generally inhibit permeation of a desired component.